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A STUDY OF THE OSTRACODA FAUNA OF THE WALDRON SHALE, FLAT ROCK CREEK, ST. PAUL, INDIANA

By H. N. Coryell and Marjorie Williamson

INTRODUCTION

This paper is concerned with the ostracode fauna of the Waldron shale. There are several publications dealing with the Waldron formation both as to its fauna and stratigraphy, but they include very little on the Ostracoda. The specimens described here were collected by the senior author from an outcrop in the type locality of the Waldron shale along Little Flat Rock Creek, about two miles southwest of St. Paul, Indiana.

STRATIGRAPHY

The Waldron is a gray-blue, very fine grained calcareous shale, highly fossiliferous in some outcrops and almost unfossiliferous in other adjacent exposures. Among the macro-fossils *Eucalyptocrinus crassus*, of the crinoids, and *Eospirifer radiatus*, *Rhynchotreta cuneata*, *Homeospira evax*, *Whitfieldella nitida*, *Stegerhynchus whitei*, *S. neglecta*, *Delthyris crispus*, and *Atrypa recticularis*, of the brachiopods, are the most abundant. In the vicinity of St. Paul, the average thickness of the formation is about six feet. The following section gives the stratigraphic position of the Waldron shale and its relationship to the other local Silurian deposits:

Silurian–Niagaran	Lockport	Hartsville limestone	10 ft.
		Waldron shale	6 ft.
		Laurel limestone	40 ft.
	Clinton–Osgood formation		15 ft.

SYSTEMATIC DESCRIPTIONS

Phylum Arthropoda.

Class Crustacea.

Order Ostracoda Latreille.

Primitiidae Ulrich and Bassler, 1908

Lindsayella, new genus

Genotype.—*Lindsayella rugosa*, new species.

Small, apparently equivalved ostracode with a straight hinge line; a broadly somewhat rounded irregular horseshoe-shaped ridge is present in the posterior two-thirds and terminates in lobes or spines at the hinge line. This ridge borders a shallow

depression in which there is a low node that may or may not be attached to the ridge. A shallow, broad, median depression extends from the hinge to the ventral margin and separates the ridge area from the anterior convexity of the valve.

Lindsayella rugosa, new species

Figure 1

Carapace small, hinge line straight; valves apparently equal; ventral margin borderless and convex in latteral view; greatest height slightly posterior of the center; the horseshoe-shaped swelling in the posterior two-thirds encloses a shallow depression with a low node in the center; the anterior end of the ridge terminates in a conspicuous spine near the center of the dorsal margin; the posterior end of the ridge rises in a less conspicuous node at the posterior end of the hinge. A shallow, vertical depression lies anterior to the ridge. It narrows centrally and flares dorsally and ventrally, the greater flare being in the ventral portion. This depression separates the ridge from the broad convexity that occupies the anterior third of the valve. The entire surface of the valve is minutely punctate.

LENGTH.—0.7 mm.; length-height ratio, 2.0.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24490.

Lindsayella waldronensis, new species

Figure 2

Carapace small; hinge line straight; ventral margin convex and borderless; greatest height central; the irregular horseshoe-shaped swelling is broadly rounded and terminates in spines, the posterior one being more conspicuous, the anterior is somewhat node-like and is located just posterior to the center; the greatest convexity of the valve is near the center of the posterior half; the entire surface is minutely punctate.

This species differs from *Lindsayella rugosa* in the following characteristics: the posterior spine is the more conspicuous one, the horseshoe-shaped swelling is smaller and occupies the posterior half only; the ventral margin is more broadly rounded, greatest height is more nearly central, the median vertical depression is broader and less constricted centrally.

LENGTH.—0.55 mm.; length-height ratio, 1.5.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24491.

CORNULINA, NEW GENUS

GENOTYPE.—*Cornulina bispinosa,* new species.

Small apparently equivalved ostracode with straight hinge line; a strong spine is located centrally on each valve at the hinge; there is a smaller nodose spine at the posterior end of the hinge, it marks the termination of a submarginal ridge; at the anterior end this ridge becomes flush with the surface; an irregularly crescent-shaped swelling extends from the base of the dorso-central spine and connects with the dorso-posterior spine enclosing a shallow depression on its dorsal side; a small lobe projects into the dorsally enclosed depression.

Cornulina bispinosa, new species

Figure 3

Carapace small, sub-ovate; the straight hinge meets the anterior margin in a broad curve; the posterior margin is more broadly rounded than the anterior; a

decided backward swing is evident in the ventral profile; a central dorsal spine projects above the hinge and leans towards the anterior; the submarginal ridge terminates in the mid-portion of the anterior area; the greatest height and thickness is located in the posterior half of the carapace. The small median lobe projects forward and upward from the posterior margin of the enclosed dorsal depression.

LENGTH.—1.0 mm.; length-height ratio, 1.9.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24492.

Cornulina silurica, new species

Figure 4

This species differs from *Cornulina bispinosa* in that it is smaller, the shape is subquadrate; greatest height is central; the crescent-shaped ridge between the spines is more broadly rounded; the spines are less prominent; the submarginal ridge parallels the posterior and ventral margin and terminates in the antero-ventral portion of the valve. The small median lobe projects more directly upward.

LENGTH.—1.05 mm.; length-height ratio, 1.76.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24493.

Cornulina fractomarginata, new species

Figure 5

Carpace small; hinge line straight; valve apparently equal; ventral margin broadly convex, meeting both the anterior and posterior in a gentle curve; greatest height nearly central; the median spine is sharp and very conspicuous; the posterior spine is more node-like and lower; the submarginal ridge extends from the posterior spine to the posterior ventral portion of the valve as a well-developed feature. Along much of the ventral margin the ridge appears only in a disconnected alignment as an apparent continuation and terminates finally in a pronounced spine near the antero-ventral area. The small median lobe forms a low swelling across the enclosed dorsal depression.

LENGTH.—1.05 mm.; length-height ratio, 1.7.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24494.

This form can be differentiated from the other known *Cornulina* species chiefly in the presence of the discontinuous ridge.

Cornulina sigmoidia, new species

Figure 6

Carapace small; hinge line straight; ventral margin broadly convex in latteral view; greatest height is distinctly posterior of the center which gives this form a pronounced backward swing; a crescent-shaped swelling forms the major convexity of the posterior half of each valve; the central spine is low and node-like; the submarginal ridge is very pronounced and sharp, extending from the posterior spine to the mid-portion of the anterior area. The small median lobe extends vertically into the enclosed dorsal depression.

LENGTH.—1.05 mm.; length-height ratio, 1.7.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24495.

This species can be distinguished from other species in the more pronounced submarginal ridge and in the low, node-like central spine.

Figs. 1–15. (See opposite page.)

PARAECHMIA ULRICH AND BASSLER, 1923

Paraechmina indianensis, new species

Figure 7

Carapace small, subquadrate; the straight hinge meets the anterior margin in a broad curve; posterior margin is dorsally truncated; greatest height is nearly central; the conspicuous spine is centrally located along the dorsal margin; a pit is located at the base of the spine near the ventral posterior side; the submarginal ridge is prominent along the posterior and ventral posterior margins but becoming less importantly developed along the remaining part of the free margin.

LENGTH.—1.05 mm.; length-height ratio, 1.5.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24496.

AECHMINARIA NEW GENUS

GENOTYPE.—*Aechminaria nodosa,* new species.

Carapace small; hinge line straight; valves are apparently equal with a prominent backward swing; a distinct dorso-centrally located spine with an adjacent pit near its base on the posterior ventral side are the prominent differentiating features.

Aechminaria nodosa, new species

Figure 8

Carapace small and somewhat oval shaped; hinge line straight; the posterior and anterior margins are broadly rounded; the ventral margin is slightly angulated; the spine is centrally located just below the hinge; the surface is apparently smooth with a few small irregularly scattered granulations; the pit is a distinct circular one near the base of the spine on the posterior ventral side.

LENGTH.—0.85 mm.; length-height ratio, 1.7.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24497.

Captions for Figs. 1–15

Fig. 1. *Lindsayella rugosa,* n. gen., n. sp. Left valve. × 23.
Fig. 2. *Lindsayella waldronensis,* n. sp. Left valve. × 29.
Fig. 3. *Cornulina bispinosa,* n. gen., n. sp. Left valve. × 17.
Fig. 4. *Cornulina silurica,* n. sp. Left valve. × 14.
Fig. 5. *Cornulina fractomarginata,* n. sp. Left valve. × 12.
Fig. 6. *Cornulina sigmoidia,* n. sp. Right valve. × 14.
Fig. 7. *Paraechmina indianensis,* n. sp. Left valve. × 14.
Fig. 8. *Aechminaria nodosa,* n. gen., n. sp. Left valve. × 17.
Fig. 9. *Aechminaria robusta,* n. sp. Left valve. × 16.
Fig. 10. *Halliella truncata,* n. sp. Left valve. × 25.
Fig. 11. *Euprimitia elongata,* n. sp. Left valve. × 20.
Fig. 12. *Eridoconcha concentrica,* n. sp. Left valve. × 26.
Fig. 13. *Bairdia planoconvexa,* n. sp. Right valve. × 22.
Fig. 14. *Cyrtocypris subovatus,* n. gen., n. sp. Left valve. × 17.
Fig. 15. *Bythocypris sinuosa,* n. sp. Right valve. × 18.

Aechminaria robusta, new species

Figure 9

Carapace small, subrectangular with a straight hinge line and a pronounced backward swing; the spine is located near the dorsal border just posterior to the middle and it leans distinctly towards the anterior; the posterior margin is broadly rounded; the greatest height is near the center of the posterior half where also the valves are more strongly convex; the pit is adjacent to the base of the spine on the posterior ventral side and it even appears as if it were crowding the expanding base; the surface is smooth except where a roughness occurs which is due in part to the type of preservation; the dorsal posterior margin is truncated so that the specimen appears to be terminated by a flattened surface.

LENGTH.—1.15 mm.; length-height ratio, 1.6.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24498.

HALLIELLA ULRICH, 1891

Halliella truncata, new species

Figure 10

Carapace small; quadrangular with a straight hinge line; anterior margin broadly curved; posterior margin is somewhat dorsally truncated; the ventral border is broadly arcuate; the greatest height is central; the submarginal ridge extends from the postero-dorsal area to the antero-ventral portion, where it becomes flush with the surface of the valve; a roundish node is located just anterior to the ridge near the hinge; the median sinus is anterior to the node; the entire surface is coarsely reticulated.

LENGTH.—0.6 mm.; length-height ratio, 1.5.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24499.

EUPRIMITIA ULRICH AND BASSLER, 1923

Euprimitia elongata, new species

Figure 11

Carapace small and elongate; straight hinge line; valves are very convex; the greatest height is centrally located; the anterior and posterior margins are curved broadly to meet the very gently convex ventral border; the ventral contact is depressed; an appearance of a false border is created by several ventral rows of reticulations which are narrower than the pits that cover the rest of the valve; a median dorsal sinus consisting of a narrow groove that extends from the dorsal margin to a central pit is located slightly posterior of the middle.

LENGTH.—0.8 mm.; length-height ratio, 1.6.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24500.

Leperditellidae Ulrich and Bassler, 1906

ERIDOCONCHA ULRICH AND BASSLER, 1923

Eridochoncha concentrica, new species

Figure 12

The valves are small, resembling somewhat a broad brachiopod or an equilateral pelecypod in shape with a wide prominent umbonal arch and with a broadly convex

free margin; six concentric grooves are present and resemble in curvature the growth lines of a brachiopod specimen; the greatest height is centrally located.

LENGTH.—0.65 mm.; length-height ratio, 1.3.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24501.

Bairdiidae Sars, 1887

BAIRDIA McCOY, 1844

Bairdia planoconvexa, new species

Figure 13

Carapace is small and inequivalve; the left valve overlaps the right, most on the dorsal margin along the line of articulation; the ventral overlap is inconspicuous; the surface of the valves are very convex; greatest height is located centrally; the dorsal margin is strongly arcuate; the posterior margin describes a slightly concave curve; the ventral margin is nearly straight and curves sharply upward to the posterior ventral acumination; the anterior margin is broadly rounded.

LENGTH.—0.95 mm.; length-height ratio, 1.7.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24502.

CYRTOCYPRUS, NEW GENUS

GENOTYPE.—*Cyrtocypris subovata,* new species.

Small, inequivalved ostracode, obliquely oval-shaped; right valve larger than the left and overlapping the left on all margins; the strongest overlap is on the ventral border just posterior of the center and it is least apparent on the dorsal margin.

Cyrtocypris subovatus, new species

Figure 14

The carapace is small, inequivalved ostracode with the right valve overlapping the left strongly on the ventral border just posterior of the center; elsewhere the overlap is less apparent; the dorsal margin shows an almost equal contact; the greatest height is located centrally; the ventral border is slightly concave near the center and at the ends it bends upward to unite with the narrowly rounded posterior margin, and with the anterior margin, which is truncated along the anterior portion of the ventral border; the entire surface is apparently smooth.

LENGTH.—0.9 mm.; length-height ratio, 1.9.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24503.

BYTHOCYPRIS BRADY, 1880

Bythocypris (?) sinuosa, new species

Figure 15

Carapace is small and inequivalved; the convexity is prominent; Greatest height is just anterior of the center; the dorsal margin is asymmetrically arched, the highest part of the arch is just anterior of the center; the anterior margin is narrowly rounded; the posterior margin is acuminate; the ventral margin is concave anterior to the center; the left valve overlaps the right narrowly on the dorsal margin; the ventral overlap is not very apparent; the posterior and anterior portion of the ventral edge is flattened into a narrow flanged contact; this flanged margin is more prominent on the anterior border than elsewhere.

LENGTH.—1.2 mm.; length-height ratio, 2.0.

HOLOTYPE.—Amer. Mus. Nat. Hist. Cat. No. 24504.